

SEQUENCE LISTING

<110> The University of York
Ian Graham

<120> Desaturase Enzymes

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<151> 2004-02-17

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<151> 2004-04-06

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<213> *Thalassiosira pseudonana*

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His Phe Ser Pro Leu Ala Lys Glu Arg Gly Val Ser Leu Val Glu Ser
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Page 1

165 170 175

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Val Val Val Thr Pro Ile Leu Ala Trp Leu Ala Val Val Asn Tyr Trp
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Thr Asp Ala Trp Leu Ile Tyr Lys Ser Gln Val Leu Asp Ile Ser Lys
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Ser Gln Val Met Arg Pro Phe Ala Ala Val Ala Ala Gly Leu Gly Pro
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Asp Ser Cys Cys Tyr Cys Lys Cys Gly Leu Lys Ile Glu Ser Ile Pro
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Ser Tyr Ser Tyr Pro Gln His Ser Phe Asn Arg Asn Ser Gln Arg Asn
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Gly Ser Arg Leu Asn Gln Tyr His Arg Thr His Ile Leu Asn Ile Leu
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Ala Val Phe Leu Ser Gly Leu Met Ser Ala Leu Ile Val Thr Pro Thr
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Pro Asn Leu His Asn Ser Ser Leu Asp Ser Gln Asp Gly Asp Pro Asp
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Ile Asp Thr Met Pro Leu Leu Ala Trp Ser Leu Lys Gln Ala Gln Ser
Page 20

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325 330 335

Phe Glu Val Ala Thr Ser Gly Arg Leu Tyr His Ile Asp Ala Asn Val
340 345 350

Arg Tyr Gly Ser Val Trp Asn Val Met Arg Phe Trp Ala Met Lys Val
355 360 365

Ile Thr Met Gly Tyr Met Met Gly Leu Pro Ile Tyr Phe His Gly Val
370 375 380

Leu Arg Gly Val Gly Leu Phe Val Ile Gly His Leu Ala Cys Gly Glu
385 390 395 400

Leu Leu Ala Thr Met Phe Ile Val Asn His Val Ile Glu Gly Val Ser
405 410 415

Tyr Gly Thr Lys Asp Leu Val Gly Gly Ala Ser His Val Asp Glu Lys
420 425 430

Lys Ile Val Lys Pro Thr Thr Val Leu Gly Asp Thr Pro Met Glu Lys
435 440 445

Thr Arg Glu Glu Ala Leu Lys Ser Asn Ser Asn Asn Asn Lys Lys Lys
450 455 460

Gly Glu Lys Asn Ser Val Pro Ser Val Pro Phe Asn Asp Trp Ala Ala
465 470 475 480

Val Gln Cys Gln Thr Ser Val Asn Trp Ser Pro Gly Ser Trp Phe Trp
485 490 495

Asn His Phe Ser Gly Gly Leu Ser His Gln Ile Glu His His Leu Phe
500 505 510

Pro Ser Ile Cys His Thr Asn Tyr Cys His Ile Gln Asp Val Val Glu
515 520 525

Ser Thr Cys Ala Glu Tyr Gly Val Pro Tyr Gln Ser Glu Ser Asn Leu
530 535 540

Phe Val Ala Tyr Gly Lys Met Ile Ser His Leu Lys Phe Leu Gly Lys
545 550 555 560

Ala Lys Cys Glu

<210> 14

<211> 1434

<212> DNA

<213> *Thalassiosira pseudonana*

<400> 14

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ttaagcaatg gtaaactcaa taccagaatc catggcaaat tgtacgacct ctcacgttt 180

cagcatccag gaggccccgt ggctctttct ctgttcaag gtcgcgacgg aacagctcta 240

tttgagtcac accatccctt catacctcga aagaatctac ttcagatcct ctccaagtac 300

gaggttccgt cgactgaaga ctctgtttcc ttcacgcga ccctagacga actcaatgg 360

gaatctccgt acgattggaa ggacattgaa aatgatgatt tcgtatctga cctacgagct 420

ctcgaattg agcacttttc tcctctcgcc aaggaaaggg gagtttact cgttgagtcg 480

tcgaaggcaa cacctcagcg gtggatggtg gttctactgc tccttgcgtc gttcttctc 540

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 attttgaatg ctgcgctccc atatctctc cctctctat cgagtcgctc aatgtggtat 720
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 aacttactga acgacgtgag agcactaacc aagctttcat acaacaacgt tgttcgggtg 960
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 aactttggcc gatcaagtgc cttttgcttc atctctcgg gaggtctcaa ctaccaaatt 1260
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<210> 15
 <211> 2906
 <212> DNA
 <213> *Thalassiosira pseudonana*

<220>
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 <223> n is a, c, g, or t

<220>
 <221> misc_feature
 <222> (14)..(14)
 <223> n is a, c, g, or t

<220>
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<220>
 <221> misc_feature
 <222> (2650)..(2650)
 <223> n is a, c, g, or t

<220>
 <221> misc_feature
 <222> (2655)..(2655)
 <223> n is a, c, g, or t

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 tgggatgaaa agaacttgag tgggtaaggg ctgattttcc tgagaaggag aagtcagctg 180
 gaacgaagtt catggagttt tgtggcaacc ctattgagac gttgcttggg ggaggaaggt 240

agcgagggttg agcatgcaaa cagaatggta taaatcacta agatgtcact cccaatgaca 300
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 ggctggatga ttaggatatg caatgcaaaa ctgtatagat tcttgctaag agactttgta 420
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 catgacatgg caagttgtca ctatggaatt cactacgtcg cttgacagga agctcacgtg 540
 gcctcggcga agaagacaaa caaaaccgag ccctcacatt tcactctgta cagttcatag 600
 tcaacaccac caatacgtg ccccccaacg ccgatatctc ccgcatccgc aaccgcatcc 660
 ccacaaaaac aggtaccgtt gcctctgccg acaacaacga ccccgccacc caatccgtcc 720
 gaaccctcaa atctctcaag ggcaacgagg tcgtcatcaa cggcacaatt tatgacattg 780
 ctgactttgt ccatcctgga ggagagggtg tcaagttctt tggtggaat gatgttacta 840
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 ttggaaaggt ttagattgg cagtcggagt gagtttgaat ggtgcacacg ttgacgttgt 960
 tgttgttca tttcgttctt tgcatttgat atccaactga cctctacaca cctctcgtt 1020
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 ggaggtgctg ttctgaact gaggagatgc ccgcaaactg ataggggggtg gtgcagcgct 2760
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<210> 16
 <211> 1434
 <212> DNA
 <213> *Thalassiosira pseudonana*

<400> 16
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 ctcaaggga acgaggtcgt catcaacggc acaatttatg acattgctga cttgtccat 180
 cctggaggag aggttgtaa gttcttggg gggaatgatg ttactattca gtataatatg 240
 attcatccgt atcacacggg gaaacatctg gagaagatga aggctgttg aaaggttga 300
 gattggcagt cggactacaa gttcgacacc cccttgaac gagagatcaa atcagaagtg 360
 ttcaagatcg tacgtcggg gcgtgagttc ggcacaacag gctacttct ccgtgccttt 420
 ttctacatcg ctctctctt caccatgcaa tacactttcg ccacatgcac caccttcacc 480
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 gcattcattg ggttgaaatg ccagcacgat gccaatcacg gagctgccag taagcgtccc 600
 tgggtgaatg acttgttggg atttgaacg gatttgattg gatctaaca atggaattgg 660
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 ttcagctcgg aacctatgtt tgcattcaat gactatccca ttggacaccc gaagagaaag 780
 tggcgcata ggttcaggg agggctactc ctctcatgc ttggacttta ctggctccc 840
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 caaatggaga atgatttcat tgtcaagagg aggaagtacg ccgttcatt gaggatgatg 960
 tacatttact tgaacattg cagcccctc atgaacaatg gttgagctg gctaccttt 1020
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 tctcacaact tcatcaattc ggaatcgtg cctacggctg acttcaaaaa gaccggagaa 1140
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agctacgctt attatccttg gattgggcag aatttggtat caacattcaa atacatgcat 1380
cgcgctggta gtggagccaa ctgggagctc aagccgttgt ctggaagtgc ctaa 1434

<210> 17
<211> 477
<212> PRT
<213> *Thalassiosira pseudonana*

<400> 17

Met Ala Pro Pro Asn Ala Asp Ile Ser Arg Ile Arg Asn Arg Ile Pro
1 5 10 15

Thr Lys Thr Gly Thr Val Ala Ser Ala Asp Asn Asn Asp Pro Ala Thr
20 25 30

Gln Ser Val Arg Thr Leu Lys Ser Leu Lys Gly Asn Glu Val Val Ile
35 40 45

Asn Gly Thr Ile Tyr Asp Ile Ala Asp Phe Val His Pro Gly Gly Glu
50 55 60

Val Val Lys Phe Phe Gly Gly Asn Asp Val Thr Ile Gln Tyr Asn Met
65 70 75 80

Ile His Pro Tyr His Thr Gly Lys His Leu Glu Lys Met Lys Ala Val
85 90 95

Gly Lys Val Val Asp Trp Gln Ser Asp Tyr Lys Phe Asp Thr Pro Phe
100 105 110

Glu Arg Glu Ile Lys Ser Glu Val Phe Lys Ile Val Arg Arg Gly Arg
115 120 125

Glu Phe Gly Thr Thr Gly Tyr Phe Leu Arg Ala Phe Phe Tyr Ile Ala
130 135 140

Leu Phe Phe Thr Met Gln Tyr Thr Phe Ala Thr Cys Thr Thr Phe Thr
145 150 155 160

Thr Tyr Asp His Trp Tyr Gln Ser Gly Val Phe Ile Ala Ile Val Phe
165 170 175

Gly Ile Ser Gln Ala Phe Ile Gly Leu Asn Val Gln His Asp Ala Asn
180 185 190

His Gly Ala Ala Ser Lys Arg Pro Trp Val Asn Asp Leu Leu Gly Phe
195 200 205

Gly Thr Asp Leu Ile Gly Ser Asn Lys Trp Asn Trp Met Ala Gln His
210 215 220

Trp Thr His His Ala Tyr Thr Asn His Ser Glu Lys Asp Pro Asp Ser
225 230 235 240

Phe Ser Ser Glu Pro Met Phe Ala Phe Asn Asp Tyr Pro Ile Gly His
245 250 255

Pro Lys Arg Lys Trp Trp His Arg Phe Gln Gly Gly Tyr Phe Leu Phe
260 265 270

Met Leu Gly Leu Tyr Trp Leu Pro Thr Val Phe Asn Pro Gln Phe Ile
275 280 285

Asp Leu Arg Gln Arg Gly Ala Gln Tyr Val Gly Ile Gln Met Glu Asn
290 295 300

Asp Phe Ile Val Lys Arg Arg Lys Tyr Ala Val Ala Leu Arg Met Met
305 310 315 320

Tyr Ile Tyr Leu Asn Ile Val Ser Pro Phe Met Asn Asn Gly Leu Ser
325 330 335

Trp Ser Thr Phe Gly Ile Ile Met Leu Met Gly Ile Ser Glu Ser Leu
340 345 350

Thr Leu Ser Val Leu Phe Ser Leu Ser His Asn Phe Ile Asn Ser Asp
355 360 365

Arg Asp Pro Thr Ala Asp Phe Lys Lys Thr Gly Glu Gln Val Cys Trp
370 375 380

Phe Lys Ser Gln Val Glu Thr Ser Ser Thr Tyr Gly Gly Phe Ile Ser
385 390 395 400

Gly Cys Leu Thr Gly Gly Leu Asn Phe Gln Val Glu His His Leu Phe
405 410 415

Pro Arg Met Ser Ser Ala Trp Tyr Pro Tyr Ile Ala Pro Thr Val Arg
420 425 430

Glu Val Cys Lys Lys His Gly Met Ser Tyr Ala Tyr Tyr Pro Trp Ile
435 440 445

Gly Gln Asn Leu Val Ser Thr Phe Lys Tyr Met His Arg Ala Gly Ser
450 455 460

Gly Ala Asn Trp Glu Leu Lys Pro Leu Ser Gly Ser Ala
465 470 475

<210> 18

<211> 1428

<212> DNA

<213> *Thalassiosira pseudonana*

<400> 18

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 ggagaggttg tcaagttctt tggtggaat gatgttacta ttcagtataa tatgattcat 240
 ccgtatcata cggggaaaca tctggagaag atgaaggctg ttggaagggt ttagattgg 300
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 cagcattgga ctcatcacgc ttactaac catagtgaaggatcccg tagcttcagc 720
 tcggaaccta tgttgcatt caatgactat ccattggac acccgaagag aaagtgtgg 780
 cataggttcc agggagggtg cttctcttc atgcttgac ttactggct ctgactgta 840
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 gagaatgatt tcattgcaa gaggaggaag tacgccgtg cattgaggat gatgtacatt 960
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<210> 19
 <211> 475
 <212> PRT
 <213> *Thalassiosira pseudonana*

<400> 19

Met Ala Pro Pro Asn Ala Asp Ile Ser Arg Ile Arg Asn Arg Ile Pro
 1 5 10 15

Thr Lys Thr Gly Thr Ser Ala Asp Asn Asn Asp Pro Ala Thr Gln Ser
 20 25 30

Val Arg Thr Leu Lys Ser Leu Lys Gly Asn Glu Val Val Ile Asn Gly
 35 40 45

Thr Ile Tyr Asp Ile Ala Asp Phe Val His Pro Gly Gly Glu Val Val
 50 55 60

Lys Phe Phe Gly Gly Asn Asp Val Thr Ile Gln Tyr Asn Met Ile His
65 70 75 80

Pro Tyr His Thr Gly Lys His Leu Glu Lys Met Lys Ala Val Gly Lys
85 90 95

Val Val Asp Trp Gln Ser Asp Tyr Lys Phe Asp Thr Pro Phe Glu Arg
100 105 110

Glu Ile Lys Ser Glu Val Phe Lys Ile Val Arg Arg Gly Arg Glu Phe
115 120 125

Gly Thr Thr Gly Tyr Phe Leu Arg Ala Phe Phe Tyr Ile Ala Leu Phe
130 135 140

Phe Thr Met Gln Tyr Thr Phe Ala Thr Cys Thr Thr Phe Thr Thr Tyr
145 150 155 160

Asp His Trp Tyr Gln Ser Gly Val Phe Ile Ala Ile Val Phe Gly Ile
165 170 175

Ser Gln Ala Phe Ile Gly Leu Asn Val Gln His Asp Ala Asn His Gly
180 185 190

Ala Ala Ser Lys Arg Pro Trp Val Asn Asp Leu Leu Gly Phe Gly Thr
195 200 205

Asp Leu Ile Gly Ser Asn Lys Trp Asn Trp Met Ala Gln His Trp Thr
210 215 220

His His Ala Tyr Thr Asn His Ser Glu Lys Asp Pro Asp Ser Phe Ser
225 230 235 240

Ser Glu Pro Met Phe Ala Phe Asn Asp Tyr Pro Ile Gly His Pro Lys
245 250 255

Arg Lys Trp Trp His Arg Phe Gln Gly Gly Tyr Phe Leu Phe Met Leu
260 265 270

Gly Leu Tyr Trp Leu Ser Thr Val Phe Asn Pro Gln Phe Ile Asp Leu
275 280 285

Arg Gln Arg Gly Ala Gln Tyr Val Gly Ile Gln Met Glu Asn Asp Phe
290 295 300

Ile Val Lys Arg Arg Lys Tyr Ala Val Ala Leu Arg Met Met Tyr Ile
305 310 315 320

Tyr Leu Asn Ile Val Ser Pro Phe Met Asn Asn Gly Leu Ser Trp Ser
325 330 335

Thr Phe Gly Ile Ile Met Leu Met Gly Ile Ser Glu Ser Leu Thr Leu
340 345 350

Ser Val Leu Phe Ser Leu Ser His Asn Leu Ile Asn Ser Asp Arg Asp
355 360 365

Pro Thr Ala Asp Phe Lys Lys Thr Gly Glu Gln Val Cys Trp Phe Lys
370 375 380

Ser Gln Val Glu Thr Ser Ser Thr Tyr Gly Gly Phe Ile Ser Gly Cys
385 390 395 400

Leu Thr Gly Gly Leu Asn Phe Gln Val Glu His His Leu Phe Pro Arg
405 410 415

Met Ser Ser Ala Trp Tyr Pro Tyr Ile Ala Pro Thr Val Arg Glu Val
420 425 430

Cys Lys Lys His Gly Val Asn Tyr Ala Tyr Tyr Pro Trp Ile Gly Gln
435 440 445

Asn Leu Val Ser Thr Phe Lys Tyr Met His Arg Ala Gly Ser Gly Ala
450 455 460

Asn Trp Glu Leu Lys Pro Leu Ser Gly Ser Ala
465 470 475

<210> 20
<211> 1485
<212> DNA
<213> *Thalassiosira pseudonana*

<400> 20
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tcccaaattc cccaacacaa cactcccacc gatgcatggc tcatttaca atcccaagtc 180
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catgactgtg gtcacatgct ggcgcggact catgccgtg atcatatga tgtacctaag 660
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<210> 21
<211> 494
<212> PRT
<213> *Thalassiosira pseudonana*

<400> 21

Met Ala Pro Pro Ser Ile Lys Asp Thr Leu Asp Glu Pro Phe Val Ser
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Pro Ala Ser Thr Lys Ser Pro Thr Thr Lys Pro Leu Leu Pro Arg Arg
20 25 30

Lys Pro Leu Lys Arg Tyr Ser Pro Ser Gln Ile Ser Gln His Asn Thr
35 40 45

Pro Thr Asp Ala Trp Leu Ile Tyr Lys Ser Gln Val Leu Asp Ile Ser
50 55 60

Lys Trp Ile Ser His His Pro Gly Gly Glu Gln Thr Leu Leu Arg Phe
65 70 75 80

Ala Gly Met Asp Ala Thr Asp Glu Leu Arg Ala Phe His Asp Asp Trp
85 90 95

Val Leu Glu Glu Lys Leu Pro His Phe Val Ile Gly Glu Val Asp Trp
100 105 110

Thr Thr Thr Gly Gly Ala Glu Asn Thr Val Thr Lys Asp Gly Gln Val
115 120 125

Ser Glu Leu Ile Lys Asp Phe Arg Glu Leu Gly Glu His Phe Asp Arg
130 135 140

Leu Gly Tyr Phe His Val Ser Pro Trp Tyr Tyr Val Arg Lys Val Ala
145 150 155 160

Thr Val Phe Ala Ile Phe Gly Cys Ala Leu Gly Leu Leu Phe Asn Thr
165 170 175

Asp Ser Ile Pro Ala His Met Leu Ala Ala Val Leu Leu Gly Ile Phe
180 185 190

Trp Gln Gln Phe Ala Phe Val Gly His Asp Cys Gly His Met Ser Ala
195 200 205

Arg Thr His Ala Arg Asp His Ile Asp Val Pro Lys Leu Gly Ala Leu
210 215 220

Val Thr Phe Phe Asn Gly Ile Ser Val Ala Trp Trp Lys Ala Thr His
225 230 235 240

Asn Val His His Ala Val Pro Asn Ser Val Asp Cys Asp Pro Asp Ile
245 250 255

Ala His Leu Pro Val Phe Ala Leu His Glu His Met Phe Thr Ser Leu
260 265 270

Phe Asn Lys Tyr His Gly Arg Val Met Glu Phe Asp Trp Leu Ala Arg
275 280 285

Asn Val Phe Val Pro Phe Gln His Phe Trp Tyr Tyr Pro Ile Met Ala
290 295 300

Val Ala Arg Phe Asn Leu Tyr Ile Gln Ser Ala Leu Phe Leu Ala Ser
305 310 315 320

Lys Asn Asp Gly His Ala Gly Arg Thr Thr Leu Asp Leu Met Ala Phe
325 330 335

Ile Gly Phe Phe Ser Trp Leu Ala Val Leu Val Ser Cys Ile Pro Ser
340 345 350

Trp Pro Glu Arg Ile Ala Phe Val Phe Val Ser His Ala Val Ala Gly
355 360 365

Leu Leu Asn Val Gln Ile Thr Leu Ser His Phe Ser Arg Pro Ile Phe
370 375 380

Asp Thr Asn Lys Glu Gly Pro Arg Phe Gly Gly Asp Phe Tyr Ser Arg
385 390 395 400

Asn Val Leu Ala Ser Leu Asp Val Ala Cys Pro Thr Tyr Leu Asp Trp
405 410 415

Phe His Gly Gly Leu Gln Phe Gln Thr Leu His His Cys Tyr Pro Arg
420 425 430

Leu Gly Arg Gln His Leu Arg Lys Thr Glu Pro Leu Ile Ala Ser Leu
435 440 445

Cys Lys Lys His Ser Leu Pro Tyr Thr Ser Lys Ser Phe Val Glu Cys
 450 455 460

Asn Met Glu Val Phe Asn Thr Leu Lys Asp Ala Ala Arg Ser Ala Lys
 465 470 475 480

Lys Trp Ser Pro Leu Ile Tyr Glu Ser Met Cys Ala Gln Gly
 485 490

<210> 22
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 <212> DNA
 <213> *Thalassiosira pseudonana*

<400> 22
 ggtaacgaat ttttag 16

<210> 23
 <211> 16
 <212> DNA
 <213> *Thalassiosira pseudonana*

<400> 23
 gtcggcatag ttatg 16

<210> 24
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 <212> DNA
 <213> *Thalassiosira pseudonana*

<400> 24
 gtgagagcac taaccaagct t 21

<210> 25
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 <212> DNA
 <213> *Thalassiosira pseudonana*

<400> 25
 caatcagtag gcttcgctg 19

<210> 26
 <211> 33
 <212> DNA
 <213> *Thalassiosira pseudonana*

<400> 26
 gcgggatcca ccatggctgg aaaaggagga gac 33

<210> 27
 <211> 26
 <212> DNA
 <213> *Thalassiosira pseudonana*

<400> 27
 gcgaattctt acatggcagg gaaatc 26

<210> 28
 <211> 33

<212> DNA
<213> Thalassiosira pseudonana

<400> 28
gcgggatcca ccatggctga cttctctcc ggc 33

<210> 29
<211> 26
<212> DNA
<213> Thalassiosira pseudonana

<400> 29
gcgaattctc aatcagtagg cttcgt 26

<210> 30
<211> 444
<212> PRT
<213> Danio rerio

<400> 30

Met Gly Gly Gly Gly Gln Gln Thr Asp Arg Ile Thr Asp Thr Asn Gly
1 5 10 15

Arg Phe Ser Ser Tyr Thr Trp Glu Glu Val Gln Lys His Thr Lys His
20 25 30

Gly Asp Gln Trp Val Val Val Glu Arg Lys Val Tyr Asn Val Ser Gln
35 40 45

Trp Val Lys Arg His Pro Gly Gly Leu Arg Ile Leu Gly His Tyr Ala
50 55 60

Gly Glu Asp Ala Thr Glu Ala Phe Thr Ala Phe His Pro Asn Leu Gln
65 70 75 80

Leu Val Arg Lys Tyr Leu Lys Pro Leu Leu Ile Gly Glu Leu Glu Ala
85 90 95

Ser Glu Pro Ser Gln Asp Arg Gln Lys Asn Ala Ala Leu Val Glu Asp
100 105 110

Phe Arg Ala Leu Arg Glu Arg Leu Glu Ala Glu Gly Cys Phe Lys Thr
115 120 125

Gln Pro Leu Phe Phe Ala Leu His Leu Gly His Ile Leu Leu Leu Glu
130 135 140

Ala Ile Ala Phe Met Met Val Trp Tyr Phe Gly Thr Gly Trp Ile Asn
145 150 155 160

Thr Leu Ile Val Ala Val Ile Leu Ala Thr Ala Gln Ser Gln Ala Gly
165 170 175

Trp Leu Gln His Asp Phe Gly His Leu Ser Val Phe Lys Thr Ser Gly
180 185 190

Met Asn His Leu Val His Lys Phe Val Ile Gly His Leu Lys Gly Ala
195 200 205

Ser Ala Gly Trp Trp Asn His Arg His Phe Gln His His Ala Lys Pro
210 215 220

Asn Ile Phe Lys Lys Asp Pro Asp Val Asn Met Leu Asn Ala Phe Val
225 230 235 240

Val Gly Asn Val Gln Pro Val Glu Tyr Gly Val Lys Lys Ile Lys His
245 250 255

Leu Pro Tyr Asn His Gln His Lys Tyr Phe Phe Phe Ile Gly Pro Pro
260 265 270

Leu Leu Ile Pro Val Tyr Phe Gln Phe Gln Ile Phe His Asn Met Ile
275 280 285

Ser His Gly Met Trp Val Asp Leu Leu Trp Cys Ile Ser Tyr Tyr Val
290 295 300

Arg Tyr Phe Leu Cys Tyr Thr Gln Phe Tyr Gly Val Phe Trp Ala Ile
305 310 315 320

Ile Leu Phe Asn Phe Val Arg Phe Met Glu Ser His Trp Phe Val Trp
325 330 335

Val Thr Gln Met Ser His Ile Pro Met Asn Ile Asp Tyr Glu Lys Asn
340 345 350

Gln Asp Trp Leu Ser Met Gln Leu Val Ala Thr Cys Asn Ile Glu Gln
355 360 365

Ser Ala Phe Asn Asp Trp Phe Ser Gly His Leu Asn Phe Gln Ile Glu
370 375 380

His His Leu Phe Pro Thr Val Pro Arg His Asn Tyr Trp Arg Ala Ala
385 390 395 400

Pro Arg Val Arg Ala Leu Cys Glu Lys Tyr Gly Val Lys Tyr Gln Glu
405 410 415

Lys Thr Leu Tyr Gly Ala Phe Ala Asp Ile Ile Arg Ser Leu Glu Lys
420 425 430

Ser Gly Glu Leu Trp Leu Asp Ala Tyr Leu Asn Lys
435 440

<210> 31
<211> 444
<212> PRT
<213> Homo sapiens

<400> 31

Met Gly Lys Gly Gly Asn Gln Gly Glu Gly Ala Ala Glu Arg Glu Val
1 5 10 15

Ser Val Pro Thr Phe Ser Trp Glu Glu Ile Gln Lys His Asn Leu Arg
20 25 30

Thr Asp Arg Trp Leu Val Ile Asp Arg Lys Val Tyr Asn Ile Thr Lys
35 40 45

Trp Ser Ile Gln His Pro Gly Gly Gln Arg Val Ile Gly His Tyr Ala
50 55 60

Gly Glu Asp Ala Thr Asp Ala Phe Arg Ala Phe His Pro Asp Leu Glu
65 70 75 80

Phe Val Gly Lys Phe Leu Lys Pro Leu Leu Ile Gly Glu Leu Ala Pro
85 90 95

Glu Glu Pro Ser Gln Asp His Gly Lys Asn Ser Lys Ile Thr Glu Asp
100 105 110

Phe Arg Ala Leu Arg Lys Thr Ala Glu Asp Met Asn Leu Phe Lys Thr
115 120 125

Asn His Val Phe Phe Leu Leu Leu Leu Ala His Ile Ile Ala Leu Glu
130 135 140

Ser Ile Ala Trp Phe Thr Val Phe Tyr Phe Gly Asn Gly Trp Ile Pro
145 150 155 160

Thr Leu Ile Thr Ala Phe Val Leu Ala Thr Ser Gln Ala Gln Ala Gly
165 170 175

Trp Leu Gln His Asp Tyr Gly His Leu Ser Val Tyr Arg Lys Pro Lys
180 185 190

Trp Asn His Leu Val His Lys Phe Val Ile Gly His Leu Lys Gly Ala
195 200 205

Ser Ala Asn Trp Trp Asn His Arg His Phe Gln His His Ala Lys Pro
210 215 220

Asn Ile Phe His Lys Asp Pro Asp Val Asn Met Leu His Val Phe Val
225 230 235 240

Leu Gly Glu Trp Gln Pro Ile Glu Tyr Gly Lys Lys Lys Leu Lys Tyr
245 250 255

Leu Pro Tyr Asn His Gln His Glu Tyr Phe Phe Leu Ile Gly Pro Pro
260 265 270

Leu Leu Ile Pro Met Tyr Phe Gln Tyr Gln Ile Ile Met Thr Met Ile
 275 280 285

Val His Lys Asn Trp Val Asp Leu Ala Trp Ala Val Ser Tyr Tyr Ile
 290 295 300

Arg Phe Phe Ile Thr Tyr Ile Pro Phe Tyr Gly Ile Leu Gly Ala Leu
 305 310 315 320

Leu Phe Leu Asn Phe Ile Arg Phe Leu Glu Ser His Trp Phe Val Trp
 325 330 335

Val Thr Gln Met Asn His Ile Val Met Glu Ile Asp Gln Glu Ala Tyr
 340 345 350

Arg Asp Trp Phe Ser Ser Gln Leu Thr Ala Thr Cys Asn Val Glu Gln
 355 360 365

Ser Phe Phe Asn Asp Trp Phe Ser Gly His Leu Asn Phe Gln Ile Glu
 370 375 380

His His Leu Phe Pro Thr Met Pro Arg His Asn Leu His Lys Ile Ala
 385 390 395 400

Pro Leu Val Lys Ser Leu Cys Ala Lys His Gly Ile Glu Tyr Gln Glu
 405 410 415

Lys Pro Leu Leu Arg Ala Leu Leu Asp Ile Ile Arg Ser Leu Lys Lys
 420 425 430

Ser Gly Lys Leu Trp Leu Asp Ala Tyr Leu His Lys
 435 440

<210> 32
 <211> 444
 <212> PRT
 <213> Homo sapiens

<400> 32

Met Ala Pro Asp Pro Val Ala Ala Glu Thr Ala Ala Gln Gly Pro Thr
 1 5 10 15

Pro Arg Tyr Phe Thr Trp Asp Glu Val Ala Gln Arg Ser Gly Cys Glu
 20 25 30

Glu Arg Trp Leu Val Ile Asp Arg Lys Val Tyr Asn Ile Ser Glu Phe
 35 40 45

Thr Arg Arg His Pro Gly Gly Ser Arg Val Ile Ser His Tyr Ala Gly
 50 55 60

Gln Asp Ala Thr Asp Pro Phe Val Ala Phe His Ile Asn Lys Gly Leu
 65 70 75 80

Val Lys Lys Tyr Met Asn Ser Leu Leu Ile Gly Glu Leu Ser Pro Glu
85 90 95

Gln Pro Ser Phe Glu Pro Thr Lys Asn Lys Glu Leu Thr Asp Glu Phe
100 105 110

Arg Glu Leu Arg Ala Thr Val Glu Arg Met Gly Leu Met Lys Ala Asn
115 120 125

His Val Phe Phe Leu Leu Tyr Leu Leu His Ile Leu Leu Leu Asp Gly
130 135 140

Ala Ala Trp Leu Thr Leu Trp Val Phe Gly Thr Ser Phe Leu Pro Phe
145 150 155 160

Leu Leu Cys Ala Val Leu Leu Ser Ala Val Gln Ala Gln Ala Gly Trp
165 170 175

Leu Gln His Asp Phe Gly His Leu Ser Val Phe Ser Thr Ser Lys Trp
180 185 190

Asn His Leu Leu His His Phe Val Ile Gly His Leu Lys Gly Ala Pro
195 200 205

Ala Ser Trp Trp Asn His Met His Phe Gln His His Ala Lys Pro Asn
210 215 220

Cys Phe Arg Lys Asp Pro Asp Ile Asn Met His Pro Phe Phe Phe Ala
225 230 235 240

Leu Gly Lys Ile Leu Ser Val Glu Leu Gly Lys Gln Lys Lys Lys Tyr
245 250 255

Met Pro Tyr Asn His Gln His Lys Tyr Phe Phe Leu Ile Gly Pro Pro
260 265 270

Ala Leu Leu Pro Leu Tyr Phe Gln Trp Tyr Ile Phe Tyr Phe Val Ile
275 280 285

Gln Arg Lys Lys Trp Val Asp Leu Ala Trp Met Ile Thr Phe Tyr Val
290 295 300

Arg Phe Phe Leu Thr Tyr Val Pro Leu Leu Gly Leu Lys Ala Phe Leu
305 310 315 320

Gly Leu Phe Phe Ile Val Arg Phe Leu Glu Ser Asn Trp Phe Val Trp
325 330 335

Val Thr Gln Met Asn His Ile Pro Met His Ile Asp His Asp Arg Asn
340 345 350

Met Asp Trp Val Ser Thr Gln Leu Gln Ala Thr Cys Asn Val His Lys
Page 41

355 360 365
 Ser Ala Phe Asn Asp Trp Phe Ser Gly His Leu Asn Phe Gln Ile Glu
 370 375 380

 His His Leu Phe Pro Thr Met Pro Arg His Asn Tyr His Lys Val Ala
 385 390 395 400

 Pro Leu Val Gln Ser Leu Cys Ala Lys His Gly Ile Glu Tyr Gln Ser
 405 410 415

 Lys Pro Leu Leu Ser Ala Phe Ala Asp Ile Ile His Ser Leu Lys Glu
 420 425 430

 Ser Gly Gln Leu Trp Leu Asp Ala Tyr Leu His Gln
 435 440

 <210> 33
 <211> 439
 <212> PRT
 <213> Thraustochytrium sp.

 <400> 33

 Met Gly Lys Gly Ser Glu Gly Arg Ser Ala Ala Arg Glu Met Thr Ala
 1 5 10 15

 Glu Ala Asn Gly Asp Lys Arg Lys Thr Ile Leu Ile Glu Gly Val Leu
 20 25 30

 Tyr Asp Ala Thr Asn Phe Lys His Pro Gly Gly Ser Ile Ile Asn Phe
 35 40 45

 Leu Thr Glu Gly Glu Ala Gly Val Asp Ala Thr Gln Ala Tyr Arg Glu
 50 55 60

 Phe His Gln Arg Ser Gly Lys Ala Asp Lys Tyr Leu Lys Ser Leu Pro
 65 70 75 80

 Lys Leu Asp Ala Ser Lys Val Glu Ser Arg Phe Ser Ala Lys Glu Gln
 85 90 95

 Ala Arg Arg Asp Ala Met Thr Arg Asp Tyr Ala Ala Phe Arg Glu Glu
 100 105 110

 Leu Val Ala Glu Gly Tyr Phe Asp Pro Ser Ile Pro His Met Ile Tyr
 115 120 125

 Arg Val Val Glu Ile Val Ala Leu Phe Ala Leu Ser Phe Trp Leu Met
 130 135 140

 Ser Lys Ala Ser Pro Thr Ser Leu Val Leu Gly Val Val Met Asn Gly
 145 150 155 160

Ile Ala Gln Gly Arg Cys Gly Trp Val Met His Glu Met Gly His Gly
 165 170 175

Ser Phe Thr Gly Val Ile Trp Leu Asp Asp Arg Met Cys Glu Phe Phe
 180 185 190

Tyr Gly Val Gly Cys Gly Met Ser Gly His Tyr Trp Lys Asn Gln His
 195 200 205

Ser Lys His His Ala Ala Pro Asn Arg Leu Glu His Asp Val Asp Leu
 210 215 220

Asn Thr Leu Pro Leu Val Ala Phe Asn Glu Arg Val Val Arg Lys Val
 225 230 235 240

Lys Pro Gly Ser Leu Leu Ala Leu Trp Leu Arg Val Gln Ala Tyr Leu
 245 250 255

Phe Ala Pro Val Ser Cys Leu Leu Ile Gly Leu Gly Trp Thr Leu Tyr
 260 265 270

Leu His Pro Arg Tyr Met Leu Arg Thr Lys Arg His Met Glu Phe Val
 275 280 285

Trp Ile Phe Ala Arg Tyr Ile Gly Trp Phe Ser Leu Met Gly Ala Leu
 290 295 300

Gly Tyr Ser Pro Gly Thr Ser Val Gly Met Tyr Leu Cys Ser Phe Gly
 305 310 315 320

Leu Gly Cys Ile Tyr Ile Phe Leu Gln Phe Ala Val Ser His Thr His
 325 330 335

Leu Pro Val Thr Asn Pro Glu Asp Gln Leu His Trp Leu Glu Tyr Ala
 340 345 350

Ala Asp His Thr Val Asn Ile Ser Thr Lys Ser Trp Leu Val Thr Trp
 355 360 365

Trp Met Ser Asn Leu Asn Phe Gln Ile Glu His His Leu Phe Pro Thr
 370 375 380

Ala Pro Gln Phe Arg Phe Lys Glu Ile Ser Pro Arg Val Glu Ala Leu
 385 390 395 400

Phe Lys Arg His Asn Leu Pro Tyr Tyr Asp Leu Pro Tyr Thr Ser Ala
 405 410 415

Val Ser Thr Thr Phe Ala Asn Leu Tyr Ser Val Gly His Ser Val Gly
 420 425 430

Ala Asp Thr Lys Lys Gln Asp
 435

<210> 34
<211> 443
<212> PRT
<213> Caenorhabditis elegans

<400> 34

Met Val Val Asp Lys Asn Ala Ser Gly Leu Arg Met Lys Val Asp Gly
1 5 10 15

Lys Trp Leu Tyr Leu Ser Glu Glu Leu Val Lys Lys His Pro Gly Gly
20 25 30

Ala Val Ile Glu Gln Tyr Arg Asn Ser Asp Ala Thr His Ile Phe His
35 40 45

Ala Phe His Glu Gly Ser Ser Gln Ala Tyr Lys Gln Leu Asp Leu Leu
50 55 60

Lys Lys His Gly Glu His Asp Glu Phe Leu Glu Lys Gln Leu Glu Lys
65 70 75 80

Arg Leu Asp Lys Val Asp Ile Asn Val Ser Ala Tyr Asp Val Ser Val
85 90 95

Ala Gln Glu Lys Lys Met Val Glu Ser Phe Glu Lys Leu Arg Gln Lys
100 105 110

Leu His Asp Asp Gly Leu Met Lys Ala Asn Glu Thr Tyr Phe Leu Phe
115 120 125

Lys Ala Ile Ser Thr Leu Ser Ile Met Ala Phe Ala Phe Tyr Leu Gln
130 135 140

Tyr Leu Gly Trp Tyr Ile Thr Ser Ala Cys Leu Leu Ala Leu Ala Trp
145 150 155 160

Gln Gln Phe Gly Trp Leu Thr His Glu Phe Cys His Gln Gln Pro Thr
165 170 175

Lys Asn Arg Pro Leu Asn Asp Thr Ile Ser Leu Phe Phe Gly Asn Phe
180 185 190

Leu Gln Gly Phe Ser Arg Asp Trp Trp Lys Asp Lys His Asn Thr His
195 200 205

His Ala Ala Thr Asn Val Ile Asp His Asp Gly Asp Ile Asp Leu Ala
210 215 220

Pro Leu Phe Ala Phe Ile Pro Gly Asp Leu Cys Lys Tyr Lys Ala Ser
225 230 235 240

Phe Glu Lys Ala Ile Leu Lys Ile Val Pro Tyr Gln His Leu Tyr Phe

245 250 255

Thr Ala Met Leu Pro Met Leu Arg Phe Ser Trp Thr Gly Gln Ser Val
260 265 270

Gln Trp Val Phe Lys Glu Asn Gln Met Glu Tyr Lys Val Tyr Gln Arg
275 280 285

Asn Ala Phe Trp Glu Gln Ala Thr Ile Val Gly His Trp Ala Trp Val
290 295 300

Phe Tyr Gln Leu Phe Leu Leu Pro Thr Trp Pro Leu Arg Val Ala Tyr
305 310 315 320

Phe Ile Ile Ser Gln Met Gly Gly Gly Leu Leu Ile Ala His Val Val
325 330 335

Thr Phe Asn His Asn Ser Val Asp Lys Tyr Pro Ala Asn Ser Arg Ile
340 345 350

Leu Asn Asn Phe Ala Ala Leu Gln Ile Leu Thr Thr Arg Asn Met Thr
355 360 365

Pro Ser Pro Phe Ile Asp Trp Leu Trp Gly Gly Leu Asn Tyr Gln Ile
370 375 380

Glu His His Leu Phe Pro Thr Met Pro Arg Cys Asn Leu Asn Ala Cys
385 390 395 400

Val Lys Tyr Val Lys Glu Trp Cys Lys Glu Asn Asn Leu Pro Tyr Leu
405 410 415

Val Asp Asp Tyr Phe Asp Gly Tyr Ala Met Asn Leu Gln Gln Leu Lys
420 425 430

Asn Met Ala Glu His Ile Gln Ala Lys Ala Ala
435 440

<210> 35

<211> 443

<212> PRT

<213> Caenorhabditis elegans

<400> 35

Met Val Val Asp Lys Asn Ala Ser Gly Leu Arg Met Lys Val Asp Gly
1 5 10 15

Lys Trp Leu Tyr Leu Ser Glu Glu Leu Val Lys Lys His Pro Gly Gly
20 25 30

Ala Val Ile Glu Gln Tyr Arg Asn Ser Asp Ala Thr His Ile Phe His
35 40 45

Ala Phe His Glu Gly Ser Ser Gln Ala Tyr Lys Gln Leu Asp Leu Leu
50 55 60

Lys Lys His Gly Glu His Asp Glu Phe Leu Glu Lys Gln Leu Glu Lys
65 70 75 80

Arg Leu Asp Lys Val Asp Ile Asn Val Ser Ala Tyr Asp Val Ser Val
85 90 95

Ala Gln Glu Lys Lys Met Val Glu Ser Phe Glu Lys Leu Arg Gln Lys
100 105 110

Leu His Asp Asp Gly Leu Met Lys Ala Asn Glu Thr Tyr Phe Leu Phe
115 120 125

Lys Ala Ile Ser Thr Leu Ser Ile Met Ala Phe Ala Phe Tyr Leu Gln
130 135 140

Tyr Leu Gly Trp Tyr Ile Thr Ser Ala Cys Leu Leu Ala Leu Ala Trp
145 150 155 160

Gln Gln Phe Gly Trp Leu Thr His Glu Phe Cys His Gln Gln Pro Thr
165 170 175

Lys Asn Arg Pro Leu Asn Asp Thr Ile Ser Leu Phe Phe Gly Asn Phe
180 185 190

Leu Gln Gly Phe Ser Arg Asp Trp Trp Lys Asp Lys His Asn Thr His
195 200 205

His Ala Ala Thr Asn Val Ile Asp His Asp Gly Asp Ile Asp Leu Ala
210 215 220

Pro Leu Phe Ala Phe Ile Pro Gly Asp Leu Cys Lys Tyr Lys Ala Ser
225 230 235 240

Phe Glu Lys Ala Ile Leu Lys Ile Val Pro Tyr Gln His Leu Tyr Phe
245 250 255

Thr Ala Met Leu Pro Met Leu Arg Phe Ser Trp Thr Gly Gln Ser Val
260 265 270

Gln Trp Val Phe Lys Glu Asn Gln Met Glu Tyr Lys Val Tyr Gln Arg
275 280 285

Asn Ala Phe Trp Glu Gln Ala Thr Ile Val Gly His Trp Ala Trp Val
290 295 300

Phe Tyr Gln Leu Phe Leu Leu Pro Thr Trp Pro Leu Arg Val Ala Tyr
305 310 315 320

Phe Ile Ile Ser Gln Met Gly Gly Gly Leu Leu Ile Ala His Val Val
325 330 335

Thr Phe Asn His Asn Ser Val Asp Lys Tyr Pro Ala Asn Ser Arg Ile
340 345 350

Leu Asn Asn Phe Ala Ala Leu Gln Ile Leu Thr Thr Arg Asn Met Thr
355 360 365

Pro Ser Pro Phe Ile Asp Trp Leu Trp Gly Gly Leu Asn Tyr Gln Ile
370 375 380

Glu His His Leu Phe Pro Thr Met Pro Arg Cys Asn Leu Asn Ala Cys
385 390 395 400

Val Lys Tyr Val Lys Glu Trp Cys Lys Glu Asn Asn Leu Pro Tyr Leu
405 410 415

Val Asp Asp Tyr Phe Asp Gly Tyr Ala Met Asn Leu Gln Gln Leu Lys
420 425 430

Asn Met Ala Glu His Ile Gln Ala Lys Ala Ala
435 440

<210> 36
<211> 419
<212> PRT
<213> Euglena gracilis

<400> 36

Met Lys Ser Lys Arg Gln Ala Leu Ser Pro Leu Gln Leu Met Glu Gln
1 5 10 15

Thr Tyr Asp Val Val Asn Phe His Pro Gly Gly Ala Glu Ile Ile Glu
20 25 30

Asn Tyr Gln Gly Arg Asp Ala Thr Asp Ala Phe Met Val Met His Phe
35 40 45

Gln Glu Ala Phe Asp Lys Leu Lys Arg Met Pro Lys Ile Asn Pro Ser
50 55 60

Phe Glu Leu Pro Pro Gln Ala Ala Val Asn Glu Ala Gln Glu Asp Phe
65 70 75 80

Arg Lys Leu Arg Glu Glu Leu Ile Ala Thr Gly Met Phe Asp Ala Ser
85 90 95

Pro Leu Trp Tyr Ser Tyr Lys Ile Ser Thr Thr Leu Gly Leu Gly Val
100 105 110

Leu Gly Tyr Phe Leu Met Val Gln Tyr Gln Met Tyr Phe Ile Gly Ala
115 120 125

Val Leu Leu Gly Met His Tyr Gln Gln Met Gly Trp Leu Ser His Asp
Page 47

130 135 140

Ile Cys His His Gln Thr Phe Lys Asn Arg Asn Trp Asn Asn Leu Val
145 150 155 160

Gly Leu Val Phe Gly Asn Gly Leu Gln Gly Phe Ser Val Thr Cys Trp
165 170 175

Lys Asp Arg His Asn Ala His His Ser Ala Thr Asn Val Gln Gly His
180 185 190

Asp Pro Asp Ile Asp Asn Leu Pro Pro Leu Ala Trp Ser Glu Asp Asp
195 200 205

Val Thr Arg Ala Ser Pro Ile Ser Arg Lys Leu Ile Gln Phe Gln Gln
210 215 220

Tyr Tyr Phe Leu Val Ile Cys Ile Leu Leu Arg Phe Ile Trp Cys Phe
225 230 235 240

Gln Cys Val Leu Thr Val Arg Ser Leu Lys Asp Arg Asp Asn Gln Phe
245 250 255

Tyr Arg Ser Gln Tyr Lys Lys Glu Ala Ile Gly Leu Ala Leu His Trp
260 265 270

Thr Leu Lys Ala Leu Phe His Leu Phe Phe Met Pro Ser Ile Leu Thr
275 280 285

Ser Leu Leu Val Phe Phe Val Ser Glu Leu Val Gly Gly Phe Gly Ile
290 295 300

Ala Ile Val Val Phe Met Asn His Tyr Pro Leu Glu Lys Ile Gly Asp
305 310 315 320

Pro Val Trp Asp Gly His Gly Phe Ser Val Gly Gln Ile His Glu Thr
325 330 335

Met Asn Ile Arg Arg Gly Ile Ile Thr Asp Trp Phe Phe Gly Gly Leu
340 345 350

Asn Tyr Gln Ile Glu His His Leu Trp Pro Thr Leu Pro Arg His Asn
355 360 365

Leu Thr Ala Val Ser Tyr Gln Val Glu Gln Leu Cys Gln Lys His Asn
370 375 380

Leu Pro Tyr Arg Asn Pro Leu Pro His Glu Gly Leu Val Ile Leu Leu
385 390 395 400

Arg Tyr Leu Ala Val Phe Ala Arg Met Ala Glu Lys Gln Pro Ala Gly
405 410 415

Lys Ala Leu

<210> 37

<211> 477

<212> PRT

<213> *Phaeodactylum tricornutum*

<400> 37

Met Gly Lys Gly Gly Asp Ala Arg Ala Ser Lys Gly Ser Thr Ala Ala
1 5 10 15

Arg Lys Ile Ser Trp Gln Glu Val Lys Thr His Ala Ser Pro Glu Asp
20 25 30

Ala Trp Ile Ile His Ser Asn Lys Val Tyr Asp Val Ser Asn Trp His
35 40 45

Glu His Pro Gly Gly Ala Val Ile Phe Thr His Ala Gly Asp Asp Met
50 55 60

Thr Asp Ile Phe Ala Ala Phe His Ala Pro Gly Ser Gln Ser Leu Met
65 70 75 80

Lys Lys Phe Tyr Ile Gly Glu Leu Leu Pro Glu Thr Thr Gly Lys Glu
85 90 95

Pro Gln Gln Ile Ala Phe Glu Lys Gly Tyr Arg Asp Leu Arg Ser Lys
100 105 110

Leu Ile Met Met Gly Met Phe Lys Ser Asn Lys Trp Phe Tyr Val Tyr
115 120 125

Lys Cys Leu Ser Asn Met Ala Ile Trp Ala Ala Ala Cys Ala Leu Val
130 135 140

Phe Tyr Ser Asp Arg Phe Trp Val His Leu Ala Ser Ala Val Met Leu
145 150 155 160

Gly Thr Phe Phe Gln Gln Ser Gly Trp Leu Ala His Asp Phe Leu His
165 170 175

His Gln Val Phe Thr Lys Arg Lys His Gly Asp Leu Gly Gly Leu Phe
180 185 190

Trp Gly Asn Leu Met Gln Gly Tyr Ser Val Gln Trp Trp Lys Asn Lys
195 200 205

His Asn Gly His His Ala Val Pro Asn Leu His Cys Ser Ser Ala Val
210 215 220

Ala Gln Asp Gly Asp Pro Asp Ile Asp Thr Met Pro Leu Leu Ala Trp
225 230 235 240

Ser Val Gln Gln Ala Gln Ser Tyr Arg Glu Leu Gln Ala Asp Gly Lys
245 250 255

Asp Ser Gly Leu Val Lys Phe Met Ile Arg Asn Gln Ser Tyr Phe Tyr
260 265 270

Phe Pro Ile Leu Leu Leu Ala Arg Leu Ser Trp Leu Asn Glu Ser Phe
275 280 285

Lys Cys Ala Phe Gly Leu Gly Ala Ala Ser Glu Asn Ala Ala Leu Glu
290 295 300

Leu Lys Ala Lys Gly Leu Gln Tyr Pro Leu Leu Glu Lys Ala Gly Ile
305 310 315 320

Leu Leu His Tyr Ala Trp Met Leu Thr Val Ser Ser Gly Phe Gly Arg
325 330 335

Phe Ser Phe Ala Tyr Thr Ala Phe Tyr Phe Leu Thr Ala Thr Ala Ser
340 345 350

Cys Gly Phe Leu Leu Ala Ile Val Phe Gly Leu Gly His Asn Gly Met
355 360 365

Ala Thr Tyr Asn Ala Asp Ala Arg Pro Asp Phe Trp Lys Leu Gln Val
370 375 380

Thr Thr Thr Arg Asn Val Thr Gly Gly His Gly Phe Pro Gln Ala Phe
385 390 395 400

Val Asp Trp Phe Cys Gly Gly Leu Gln Tyr Gln Val Asp His His Leu
405 410 415

Phe Pro Ser Leu Pro Arg His Asn Leu Ala Lys Thr His Ala Leu Val
420 425 430

Glu Ser Phe Cys Lys Glu Trp Gly Val Gln Tyr His Glu Ala Asp Leu
435 440 445

Val Asp Gly Thr Met Glu Val Leu His His Leu Gly Ser Val Ala Gly
450 455 460

Glu Phe Val Val Asp Phe Val Arg Asp Gly Pro Ala Met
465 470 475

<210> 38

<211> 404

<212> PRT

<213> Borago officinalis

<400> 38

Ser Phe Pro Leu Lys Ser Leu Ala Gly Gln Glu Val Thr Asp Ala Phe
Page 50

1 5 10 15
 Val Ala Phe His Pro Ala Ser Thr Trp Lys Asn Leu Asp Lys Phe Phe
 20 25 30
 Thr Gly Tyr Tyr Leu Lys Asp Tyr Ser Val Ser Glu Val Ser Lys Asp
 35 40 45
 Tyr Arg Lys Leu Val Phe Glu Phe Ser Lys Met Gly Leu Tyr Asp Lys
 50 55 60
 Lys Gly His Ile Met Phe Ala Thr Leu Cys Phe Ile Ala Met Leu Phe
 65 70 75 80
 Ala Met Ser Val Tyr Gly Val Leu Phe Cys Glu Gly Val Leu Val His
 85 90 95
 Leu Phe Ser Gly Cys Leu Met Gly Phe Leu Trp Ile Gln Ser Gly Trp
 100 105 110
 Ile Gly His Asp Ala Gly His Tyr Met Val Val Ser Asp Ser Arg Leu
 115 120 125
 Asn Lys Phe Met Gly Ile Phe Ala Ala Asn Cys Leu Ser Gly Ile Ser
 130 135 140
 Ile Gly Trp Trp Lys Trp Asn His Asn Ala His His Ile Ala Cys Asn
 145 150 155 160
 Ser Leu Glu Tyr Asp Pro Asp Leu Gln Tyr Ile Pro Phe Leu Val Val
 165 170 175
 Ser Ser Lys Phe Phe Gly Ser Leu Thr Ser His Phe Tyr Glu Lys Arg
 180 185 190
 Leu Thr Phe Asp Ser Leu Ser Arg Phe Phe Val Ser Tyr Gln His Trp
 195 200 205
 Thr Phe Tyr Pro Ile Met Cys Ala Ala Arg Leu Asn Met Tyr Val Gln
 210 215 220
 Ser Leu Ile Met Leu Leu Thr Lys Arg Asn Val Ser Tyr Arg Ala His
 225 230 235 240
 Glu Leu Leu Gly Cys Leu Val Phe Ser Ile Trp Tyr Pro Leu Leu Val
 245 250 255
 Ser Cys Leu Pro Asn Trp Gly Glu Arg Ile Met Phe Val Ile Ala Ser
 260 265 270
 Leu Ser Val Thr Gly Met Gln Gln Val Gln Phe Ser Leu Asn His Phe
 275 280 285

Ser Ser Ser Val Tyr Val Gly Lys Pro Lys Gly Asn Asn Trp Phe Glu
290 295 300

Lys Gln Thr Asp Gly Thr Leu Asp Ile Ser Cys Pro Pro Trp Met Asp
305 310 315 320

Trp Phe His Gly Gly Leu Gln Phe Gln Ile Glu His His Leu Phe Pro
325 330 335

Lys Met Pro Arg Cys Asn Leu Arg Lys Ile Ser Pro Tyr Val Ile Glu
340 345 350

Leu Cys Lys Lys His Asn Leu Pro Tyr Asn Tyr Ala Ser Phe Ser Lys
355 360 365

Ala Asn Glu Met Thr Leu Arg Thr Leu Arg Asn Thr Ala Leu Gln Ala
370 375 380

Arg Asp Ile Thr Lys Pro Leu Pro Lys Asn Leu Val Trp Glu Ala Leu
385 390 395 400

His Thr His Gly